

Q1

a)

Q1 a)

	1%	30%	5%	
	Ca	Protein	Fiber	
90 { Corn	0.001	0.09	0.02	\$ 0.2
Soybean	0.002	0.6	0.06	\$ 0.6

Dec Var:

Let X_1 : # of corns in pounds
 X_2 : # of soybean in pounds

Obj: Min $0.2X_1 + 0.6X_2$

Constraints:

$$\begin{aligned} 0.001X_1 + 0.002X_2 &\leq 0.9 \\ 0.09X_1 + 0.06X_2 &\geq 27 \\ 0.02X_1 + 0.06X_2 &\leq 4.5 \\ X_1 + X_2 &= 90 \\ X_1, X_2 &\geq 0 \end{aligned}$$

90	Ca	Protein	Fiber	Cost
Corn	0.001	0.09	0.02	0.2
Soybean	0.002	0.6	0.06	0.6
Constraint	0.01	0.3	0.05	
Objective	min	=E2*B9+E3*B10		
Decision Variable				
Corn	52.9411776470588			
Soybean	37.0588233529412			
Constraint	=B2*B9+B3*B10	<=	=B4*A1	
	=C2*B9+C3*B10	>=	=C4*A1	
	=D2*B9+D3*B10	<=	=D4*A1	
	=B9+B10	=	=A1	

b) Optimal Solution

Optimal Solution		
Objective	min	32.8235295
Decision Variable		
Corn		52.9411777
Soybean		37.0588234

设置目标:

到: ☐ 最大 ☒ 最小 ☐ 目标值:

通过更改可变单元格:

遵守约束:

G14

添加
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Q2

a)

Q2 a)

Month	1	2	3	4	5
# of Labors	110	130	70	165	50
Cost / laborer	110	140	170	230	250

Dec Var:

X_{ij} : # of people hired at the beginning of month i for j months

$X_{11}, X_{12}, X_{13}, X_{14}, X_{15}$

$X_{21}, X_{22}, X_{23}, X_{24}$

X_{31}, X_{32}, X_{33}

X_{41}, X_{42}

X_{51}

obj min $110X_{11} + 140X_{12} + 170X_{13} + 230X_{14} + 250X_{15} + 110X_{21} + 140X_{22} + 170X_{23} + 230X_{24} + 110X_{31} + 140X_{32} + 170X_{33} + 110X_{41} + 140X_{42} + 110X_{51}$

Constraints: $X_{11} + X_{12} + X_{13} + X_{14} + X_{15} \geq 100$

s.t $X_{12} + X_{13} + X_{14} + X_{15} + X_{21} + X_{22} + X_{23} + X_{24} \geq 130$

$X_{13} + X_{14} + X_{15} + X_{22} + X_{23} + X_{24} + X_{31} + X_{32} + X_{33} \geq 70$

$X_{14} + X_{15} + X_{23} + X_{24} + X_{32} + X_{33} + X_{41} + X_{42} \geq 165$

$X_{15} + X_{24} + X_{33} + X_{42} + X_{51} \geq 50$

Objective	$=B3*(C6+C11+C15+C18+C20)+C3*(C7+C12+C16+C19)+D3*(C8+C13+C17)+E3*(C9+C14)+F3*C10$		
Constraint	$=SUMPRODUCT(C6:C20,D6:D20)$	\geq	$=B2$
	$=SUMPRODUCT(C6:C20,E6:E20)$	\geq	$=C2$
	$=SUMPRODUCT(C6:C20,F6:F20)$	\geq	$=D2$
	$=SUMPRODUCT(C6:C20,G6:G20)$	\geq	$=E2$
	$=SUMPRODUCT(C6:C20,H6:H20)$	\geq	$=F2$

Decision Variable			1	2	3	4	5
	x11	0	1	0	0	0	0
	x12	0	1	1	0	0	0
	x13	0	1	1	1	0	0
	x14	60	1	1	1	1	0
	x15	50	1	1	1	1	1
	x21	0	0	1	0	0	0
	x22	0	0	1	1	0	0
	x23	20	0	1	1	1	0
	x24	0	0	1	1	1	1
	x31	0	0	0	1	0	0
	x32	0	0	0	1	1	0
	x33	0	0	0	1	1	1
	x41	35	0	0	0	1	0
	x42	0	0	0	0	1	1
	x51	0	0	0	0	0	1

b) Optimal Solutions

Optimal Solutions	
Objective	33550
Decision Variable	
x11	0
x12	0
x13	0
x14	60
x15	50
x21	0
x22	0
x23	20
x24	0
x31	0
x32	0
x33	0
x41	35
x42	0
x51	0

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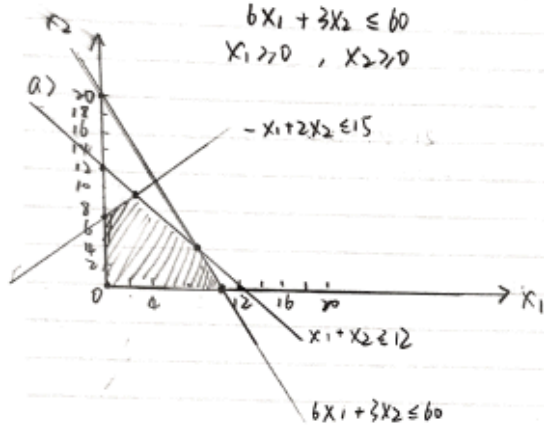
遵守约束:

\$K\$10 >= \$M\$10
\$K\$11 >= \$M\$11
\$K\$7 >= \$M\$7
\$K\$8 >= \$M\$8
\$K\$9 >= \$M\$9

添加
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Q3

Q3 Max $10X_1 + 20X_2$
 s.t $-X_1 + 2X_2 \leq 15$
 $X_1 + X_2 \leq 12$
 $6X_1 + 3X_2 \leq 60$
 $X_1 \geq 0, X_2 \geq 0$



b) Optimal Sol.

$$\begin{cases} -X_1 + 2X_2 = 15 & \text{①} \\ X_1 + X_2 = 12 & \text{②} \end{cases}$$

$$\text{①} + \text{②} : 3X_2 = 27$$

$$X_2 = 9$$

$$\therefore \begin{cases} X_1 = 3 \\ X_2 = 9 \end{cases}$$

$$\Rightarrow 10X_1 + 20X_2 = 210$$

\therefore Optimal sol is $(3, 9)$
 with objective value of 210

Q4

a)

Q4 a)

	C_1	C_2	C_3	Output
F1	600	800	700	400
F2	400	900	600	500
Size	200	200	400	

Dec Variables:

let X_{ij} : # of units shipped from factory i to customer j
 $i = 1, 2 \quad j = 1, 2, 3$

$$X_{11}, X_{12}, X_{13}, X_{21}, X_{22}, X_{23}$$

Objectives : $\min 600X_{11} + 800X_{12} + 700X_{13} + 400X_{21} + 900X_{22} + 600X_{23}$

Constraints

$$x_{11} + x_{12} + x_{13} \leq 400$$

$$x_{21} + x_{22} + x_{23} \leq 500$$

$$x_{11} + x_{21} \geq 300$$

$$x_{12} + x_{22} \geq 200$$

$$x_{13} + x_{23} \geq 400$$

$$x_{ij} \geq 0$$

	Customer1	Customer2	Customer3	Output
Factory1	600	800	700	400
Factory2	400	900	600	500
Size	300	200	400	
Decision Variable				
	Customer1	Customer2	Customer3	
Factory1	0	200.00000055	199.999999306667	
Factory2	299.999999326667	0	200.000000693333	
Objective	=SUMPRODUCT(B8:D9,E			
Constraints	=SUM(B8:D8)	<=	=E2	
	=SUM(B9:D9)	<=	=E3	
	=SUM(B8:B9)	>=	=B4	
	=SUM(C8:C9)	>=	=C4	
	=SUM(D8:D9)	>=	=D4	

b) Optimal Solutions

Optimal Solution			
Objective	540000		
Decision Variable			
	Customer1	Customer2	Customer3
Factory1	0	200	200
Factory2	300	0	200

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